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Rescue of the S. S. "Colombia."

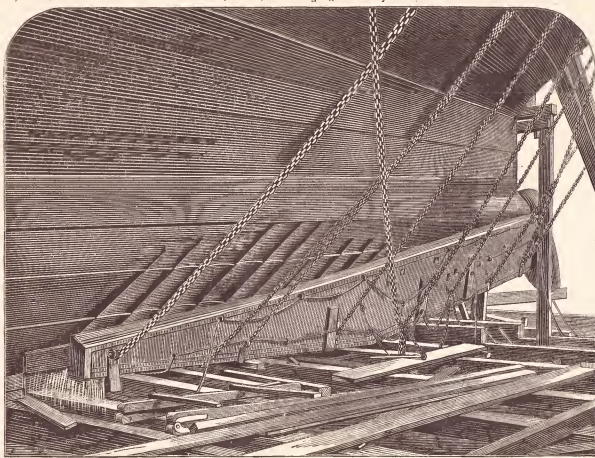
THE Pacific Steam Navigation Company's Royal Mail steamer Colombia, 1,823 tons gross register, when on a voyage from Panama to Callao in charge of a pilot, struck on a reef of rocks in the Port of Ballenita on the 28th of July, 1878. There being no telegraphic communication, the first information of the then missing steamer reached Callao on the 9th of August by the next mail steamer from Panama, the Oroya, which brought on also the Colombia's mails and passengers.

The Colombia, at the time she struck, was some five feet by the stern, and took the rocks in the after part of hull and stuck in a cleft. Almost all the cargo in the after hold was at once removed and placed well forward, but all efforts to get her off were futile, until she received the assistance of

oakum, etc., and a Gwynne's No. 7 centrifugal pump; also, a small tug steamer was in attendance. We reached Ballenita on August 13th, at 4:30 P. M., and found the Colombia as represented by the Oroya, with the exception that around the stern, between the main rail and the spar deck, had been planked, and thus the main deck was comparatively dry.

The after hold, as previously stated, was full of water, which was emitting an effluvia similar to subphurated hydrogen gas, so very strong and offensive that all brass work was tarnished and white paint blackened. Simultaneous to starting the divers to examine the damage early in the morning after our arrival, the centrifugal pump was put in place, connected to the winch steam pipes, and started to pump the putrid water out of the hold, and kept it running night and day until

In order to put the vessel into such a state that she could be safely towed to Callao, a distance of 700 miles, a wooden box was constructed of irregular form to cover the damaged part; fortunately sufficient material had been brought for the job, but there was very little to spare. First, a stage was constructed and sunk in position for the divers to work off, but on account of the strong current alternating with the tides we were obliged to shift our moorings to a more sheltered part of the bay, but were still subject to considerable movement, as the port is a surf one. Next a line was stretched from the forward part of the damage to the centre of the box at the after end of the stem tube, from which ordimates were taken, thus enabling a base line to be struck for the top of the box or caisson; to get exact dimensions for which two well-stretched lines were sent down marked



RESCUE OF THE S. S. "COLOMBIA."—FIG. 1.

the Lontue two days after she struck. When afloat her after hold was full of water, and she trimmed with her stern almost out of the water and her stern under, with water on the main deck as far forward as the after hatches.

The information of the damage brought by the Oroya was to the effect that her bottom had been examined by native divers when the ship was afloat, who reported a hole in her port side, abreast of the after gangway ladder, 18 feet 4 inches long and 2 feet wide at the widest part.

On August 10th a party consisting of Captain King, myself, an able staff of mechanics and two divers, started from Callao in the steamship Santiago for Ballenita, with a good stock of useful materials, consisting of lumber, bolts, iron, cement,

the smell became less offensive. The divers, after examining the bottom, reported that there was no hole where stated by the natives, but that the rudder had been carried away, rudder-post broken off at the 17 feet 6 inches draught mark, propeller with two out of the four blades broken off, stern-post broken off close under stern tube, and from there the plates and keel had been carried away in a diagonal direction for about 50 feet, the edges of the plates being ragged, and bent in some places, and the keel from that forward for about 10 feet showing signs of damage. (See Fig. 2, p. 245.)

From this it will be seen that the actual state of matters was very different from what had been expected, so much so that special and novel arrangements had to be devised to overcome the difficulty, an account of which will be of interest to engineers.

with different colored pieces of bunting at every 5 feet of their lengths; these were stretched and secured one on each side to represent the upper edge of the box. At each of the marks on these lines templates were carefully fitted, showing the section of the hull below the line, also a longitudinal template was made of the upper edge. From these templates a box was constructed, as shown in the sketch, the upper edge of which was made $\frac{1}{2}$ inch easy on each side, to make up for which deficiency and to secure a tight fit, the upper edges, where it took the plates, were padded with canvas and packed with oakum, over which was a second layer of canvas for the divers to pack any defective parts when in place. The box was built on the spar deck, abreast of the engine-room skylight, and launched sideways overboard.

Continued on page 245.

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CONTENTS—November 1st, 1879.

Review of S. S. Columbia.....	240, 245
Editorial Announcements.....	242
What's in a Name.....	242
The Anti-Vaccination League.....	242
A Note of Warning.....	242
Speed of Ice-Boats.....	243
Fair of the American Institute—Motors other than Steam	
Engines and Wood Working Machinery.....	243
American Ledger and Record Paper.....	244
Armstrong's Improved Chains.....	244
Balloons for Arctic Exploration.....	244
Wall of Distress from England.....	245
Importation of Gold.....	245
Faber's Talking Machine.....	246
The Centrifugal Milk-Skimming Machine.....	246
Stylographic Pen.....	246
Sorens versus Pablies.....	246
Ball Turning by Hand.....	246
Recently Patented Inventions.....	247
American Cars.....	247
Toughened Glass Sleepers for Railways.....	248
Outrigger as Food.....	248
Controlling Horses by Electricity.....	249
Fire-Proofing Composition.....	249
Rubbish.....	249
Shop and House Hints.....	250
Book Notices.....	251
List of Patents.....	251, 252
Premium List.....	252, 254

Important to Advertisers.

Our next issue will comprise an extra edition of 25,000 copies, for immediate distribution to a carefully selected list of names throughout the United States, also a sufficient number to supply the present demand for specimen copies, which now average 200 per day, and will, we have reason to believe, maintain this average till Jan. 1st, which will require many thousand more.

We shall admit to this edition, adding as much space as necessary to accommodate it, advertising at our present rates, 25 cents per line. We shall go to press on the 8th of the month, and all orders for advertising must reach us by the 7th, to ensure insertion. R. T. Triplett is our authorized agent for making advertising contracts, and letters may be addressed to him at our office.

With the experience of two years in the publication of the ILLUSTRATED SCIENTIFIC NEWS, it appears to us that there is a large unoccupied field for the circulation of a well-edited and well-sustained low-priced journal, devoted to Popular Science and the Industrial Arts. This is proved

by the fact that the regular circulation of our paper has been four times greater this year than it was last year; this is certainly an encouraging feature. Still, we are not quite satisfied. We wish to do much more for our readers than our present limited space will allow; therefore, as announced in our last, we propose with the new volume to greatly enlarge and otherwise improve the paper, and without any increase in the subscription price, save the addition of 10 cents to prepay cost of postage.

This enlargement of the paper will increase its cost to us at least fifty per cent.; but we shall venture upon it in perfect confidence that our many friends will do all they can to increase our circulation.

To induce our friends to work for the extension of our circulation, we have arranged a most valuable and comprehensive PREMIUM LIST, which is published on another page.

Please look at this list, and see what you think of it. In the distribution of premiums we have intended to meet diversified tastes and interests. We begin with a one hundred dollar cash premium, for which we anticipate a generous rivalry; and whoever gets it will receive a check for the money immediately after February 1st, 1880.

Moreover, every one who competes for either of the cash premiums and fails, will be entitled to a premium from our general list fully commensurate with the number of subscriptions he sends, as though he had not competed for the cash premium. This none can lose their labor, no matter how small a number they succeed in obtaining, provided it equal or exceed the smallest number for which we offer a premium.

What's in a Name?

An English paper says: "The Paris Exhibition medals have not been so highly valued as was expected, for nearly two thousand bronze medals remain unclaimed, as well as three hundred silver and twenty-three gold. Several American exhibitors, too, are grumbling over their diplomas, which display some absurd translations, owing to the unsanctioned of the Commissioners with the American vernacular. Thus the diploma intended for the Gardner Gun Company is granted for a "Fusil pour la Jardiñerie," the Waterbury Button Company receives its award in the name of "Waterbury, Button & Company," and, worst of all, the Providence Tool Company becomes the "Providence Fool Company."

There is no end to the fun-provoking mistakes which are made in the proper names of our countrymen on the continent of Europe.

At the time of the death of our great American statesman, Daniel Webster, a French newspaper published the mournful intelligence as follows: "D. Ware, the great American lexicographer, is no more."

Mr. S. H. Wales, the senior editor of the SCIENTIFIC NEWS, visited France in 1855 as one of the Commissioners to the French Exhibition. His arrival in Paris was officially announced as "Monsieur S. H. Worle," and on the occasion of his visit to the famous Spa in Belgium, he was duly greeted as "S. H. Wals." In this sort of way one might very easily lose his identity, but there is no use in getting angry about it.

We advise the Providence Tool Company to send for their medal. It conveys the useful hint, not to do foolish things.

The Anti-Vaccination League.

We always admire sincerity, even though coupled with error, fanaticism or folly.

Comment us to a man who sincerely advocates a mistake, rather than to the hypocrite who, for personal advantage, gives outward support to anything which he secretly does not approve.

Perhaps the most conspicuous example of sincere folly displayed within the memory of any person now living is that of William Tebb.

William Tebb might have been a Russian, or a Turk, or a Prussian, or, perhaps, Italian, but in spite of all temptations he remained an English-

man until he got into a little dispute with the Government on the subject of vaccination.

The British Parliament, after employing the best means and most capable experts in the realm to ascertain the facts relative to the prevention of small-pox by vaccination, passed an act rendering vaccination compulsory, under certain conditions. In doing so, however, this generally able and discerning body of legislators entirely overlooked the existence of Tebb afore-said. Tebb defied the law. Some one who called himself doctor told Tebb that vaccination would not prevent small-pox, and might do his child an injury. Tebb heard and believed. Then Tebb began to read. Like most people who desire to confirm a belief rather than to find truth, Tebb easily found statements in favor of his views. Everything he found favorable to vaccination he disbelieved, and everything that he knew beforehand was favorable, he probably (as is the way with fanatics) refused to read or read. The summing up of evidence taken on this plan is easy, and the verdict may be predicted with confidence. Having reached his unfavorable verdict upon vaccination, Tebb, who never before had been noted for scientific or other expertise, soon began to be heard from. His convictions of the tyranny of an act to compel vaccination, as the convictions of this class of investigators generally are, were of the strongest possible character. Tebb found his mission to be opposition to vaccination, and resistance to laws compelling it. If our memory does not mislead us, he was subjected to thirteen prosecutions, and served thirteen penitents for refusing to have sundry infantile Tebbs protected from small-pox according to law. Finally the authorities began to regard Tebb as rather insane upon this subject and imposed no more penalties.

Tebb thus became a kind of sanitary martyr, an apostle of anti-vaccination in his own country; but he yearned for wider fields of usefulness, and after having lectured and published tracts, and finally established an anti-vaccination newspaper, he has come on an anti-vaccination mission to New York.

Here he has found men of eminence in the medical profession to take him by the hand and offer the encouragement due to the cause he represents.

Among these is the eminent Dr. Gunn, of large calibre, naturally inheriting from his father, and artificially (we trust the printer will not substitute "superficial") supplied with the latest improvements in medical artillery. Another medical howitzer to welcome the apostle Tebb is Dr. Wilder, who, if he is not already as famous as Dr. Gunn, now sees his way clear to become so.

The result is an Anti-Vaccination League, organized in this city Oct. 10th, 1879.

The Anti-Vaccination League was organized by the choice of Dr. Alexander Wilder as President, J. W. Nickles as Secretary, H. Hallbrook, Treasurer; J. E. Briggs, M.D., Thos. A. Granger, M.D., and R. A. Gunn, M.D., as Executive Committee. The object of the society is to awaken the attention of the public to the evils of vaccination, and to its inutility, to put an end to its practice, and to prevent legislation for its enforcement.

The organization was effected in the lecture-room of the United States Medical College, in Thirteenth Street. Strange to say, we cannot find the name of this celebrated institution in the New York City Directory. Can it be that those physicians in the interest of vaccination, and who annually enrich themselves by this practice, have conspired to exclude it? We are reluctant to believe this, but the fact of exclusion is suspicious. Nevertheless, the United States Medical College exists, and the Anti-Vaccination League exists, and a crusade against vaccination, which will probably give some trouble to our already overtasked Board of Health, and some notoriety to a few M.D.'s who are really suffering for it, is likely to be inaugurated.

A Note of Warning.

THE sharp advance in prices that has been recent in many lines of trade is, we think, likely to produce a reaction. It is quite clear that the speculative spirit is reviving, and that the bitter lessons of the past have not taught all men financial wisdom.

Congratulating a hardware merchant in this city upon the recent improvement in prices in that trade, he, to our surprise, informed us that the advance has been too great and that his sales have been seriously diminished in consequence.

We have just learned that a large order for iron work for an important building now erecting in this city is about to go to England, on account of the advance in the price of iron girders, etc., here.

That this danger is apprehended by our country is manifest from the following taken from the American *Manufacturer and Iron World*, published at Pittsburgh, the very heart of the iron trade in this country:

"There is reason to fear the recent advance in the price of iron has been too rapid, if not too great. It is well known that a large quantity of

pig iron is being imported that would not have been if the advance had been more gradual and moderate. But the inflow of foreign iron, there is reason to fear, will not stop with the new market. In fact, a London dispatch states that an American order has been placed in the North of England for 400 tons of puddled bars, and we hear of an order for 1000 tons of wire rods having gone to England that would have come to this market had it not been for high prices. This order went abroad notwithstanding a preference was shown for American rods. These are but a few instances of the danger of advancing prices too rapidly, whereby foreign competition is invited and money sent out of the country which should be kept at home to still further develop and establish the industries which our present tariff has made it possible to build up in this country. It is feared the too attempting to grasp too much our ore producers and iron manufacturers will in the end lose far more than they will gain. Of course no single producer or manufacturer can stay the tide of advancing prices, but all can refrain from overvaluing the market, which can only benefit speculators.

Speed of Ice-boats.

A SOMEWHAT remarkable dispute upon the above subject has recently added interest to the columns of the New York *Evening Post*.

Some one, in the first instance, asked whether an ice-boat could sail at greater speed than the wind which impels it. The *Post* replied at once. Then a lady correspondent, in a very pretty letter, showing far more knowledge of mechanics than is usual with ladies, answered "yes," with a diagram and demonstration; but, modestly expressed a doubt of its correctness. The *Post* again said it did not feel. Next another correspondent confirmed the lady's answer, that an ice-boat sailing with the wind abeam can exceed in velocity the wind which impels it. Then followed another correspondent who answered "yes," adding the fact that an ice-boat had made sixty miles an hour while her sails could not possibly have withstood a wind blowing abeam with such velocity. Next a letter from Thos. D. Barnard, Ph.D., goes not only into facts but theories to an extent which makes his letter the most interesting of any in the entire list. We quote this letter:

"That an ice-boat can and does sail faster than the wind which impels it is a fact well known to every ice yachtsman. The *Blazer*, of Poughkeepsie, N. Y., for example, has a record of nine miles run in seven minutes—a velocity of 77 miles per hour. Her owner says that on occasional spurts she has made the tremendous speed of 120 miles a minute, or at the rate of 120 miles an hour. The Whiff, which it will be remembered was exhibited at the Centennial Exposition, in an ordinary run on the Hudson River (not a race) accomplished a mile in 16 seconds, or exceeded the rate of 52 miles an hour. An abundance of similar instances might be quoted. It will hardly be doubted that in the above cases the boats sailed faster than the wind, as a very heavy gale averages a speed of some 50 miles an hour; a hurricane (flood) blows much faster than 77 miles in the same period, and a wind moving at the rate of 120 miles an hour would have devastated the land, for such a velocity exceeds that of the most terrific tornadoes."

"Paradoxical as it appears, the fact of the capability of an ice-boat to outstrip the wind is perfectly in accordance with the laws of mechanics. Every one knows that a stone dropped to the earth constantly falls faster until it is exactly pulled to a stop. This is but an example of the effect of any constant push or pull. Such a force always produces an accelerated motion. A steam engine working at a regular speed to drive a steamboat, or the wind pushing the sails of a vessel, are instances of constant forces. Between a boat moving in the water, however, and one sliding on the ice there is one important difference. When a steamer is pushed ahead by her engine or a ship by her sails, the water in front must be moved out of the way. Now, if a certain amount of water is pushed aside in a certain time, then if the ship's speed be doubled (twice the space must be pushed aside in the same time. Consequently the vessel meets not twice, but four times the resistance she encountered before; and it will be evident that to keep on increasing the speed would be to oppose a resistance which augments very much more rapidly. So that a limit to a vessel's possible speed in the water is very soon found."

"An ice-boat, of course, meets no such opposition. In construction it is a skate, and it sails best with the wind on the side, or in nautical phrase 'aboard.' Anomalous steam engines, and water sailers, an ice-boat takes when sailing away from the wind as well as when beating into it. The sail is, as a rule, always hauled 'flat aft,' and hence the craft offers very little surface to the opposition of the air in the direction of its motion. The principal retarding force is the friction be-

tween the runners and the ice. How small this is, or in other words how easy it is to slide over with the expenditure of very little power, every one who has ever rowed a skate understands. As a matter of fact, in the case of the ice-boat, the friction remains practically stationary, while the velocity under the constant push of the wind goes on increasing."

"Of course, when the ice-yacht travels directly before the wind she is impelled similarly to the balloon and cannot move faster than the breeze; but with a brisk wind abeam and unlimited ice room, there is no reason why an ice-boat should not move much more rapidly than the wind, in spite of the impelling air, but far in excess of any speed which has ever been dreamed of in a conveyance built by man."

PARK BENJAMIN, Ph.D.
New York, October 12th, 1879.

These correspondents are all right, but the letter of Mr. Benjamin best shows the reason why an ice-boat can beat the wind in speed. We, however, hardly catch the idea conveyed by the expression "tacks when sailing away from the wind."

Prof. Elias Loomis, of Yale College, confirms the answer of the *Evening Post*. According to this authority an ice-boat on account of friction must sail at all times with less velocity than that of the wind, except when the hulling of a fitful wind reduces its velocity, while the momentum of the boat maintains the speed of the latter.

Dr. A. F. M. Barnard, President of Columbia College, also comes to the support of the *Evening Post*. Like Prof. Loomis, he regards the answer of the *Post* as too obvious to require discussion, it being understood that the velocity of the wind is constant."

Whereupon, accepting the *dictum* of the professors and pure theorists against the *Empiricists*, can explain as is shown by Mr. Benjamin's letter, the *Evening Post* congratulates itself in the following strain:

"When the *Evening Post* replied as it did to 'L. R. V.' it was not an argument or explanation was offered, because the reply given was founded upon a fundamental principle of mechanics, without which 'perpetual motion,' so-called, would be entirely practicable. Now that our assertion—resting upon a very firm conviction that it is as impossible to create force, as it is to make matter, out of nothing—is disputed, we think it better to rest the question upon the high authority of Professor Loomis and President Barnard, than to occupy space with a discussion of the fundamental laws of applied mathematics."

Who shall decide, when doctors disagree? We have already intimated our view of this question, which is not only based upon theory, and the fact that in the field of practical mechanics the production of velocity greater than that of a prime mover by the multiplying effect of inclines is a matter of daily experience, but upon an experiment with an ice-boat and an anemometer which many years ago was performed on the frozen surface of the Hudson River. The time is too far back for us to give figures; but we can positively aver that in that experiment the speed of the ice-boat (a home-made affair, but a splendid sailor) exceeded considerably the velocity of the wind as indicated by the anemometer.

We add this contribution to the discussion as a pull for the above-named professors to chew; and if they think the experiment referred to untrustworthy, the coming winter will doubtless afford ample opportunities to verify or disprove it.

When theory conflicts with facts, "so much the worse for theory;" but, with Mr. Benjamin, we fail to see how there is anything to conflict with mechanical principles in the statement that an ice-boat can sail faster than the wind which impels it, when the wind is abeam, and we can assure the *Evening Post* that its statement of the perpetual motion is altogether impertinent to this question, which is not whether it is possible to create force out of nothing, but to so apply two forces (the wind, and the resistance of the ice to the runners of the boat when inclined to the direction of the wind) that the sum of the resistance (co-efficient of friction and head pressure of the air) shall be less than the product of the weight of the impelling air multiplied by its velocity. If it be possible to so arrange matters, it is evident that the boat must increase beyond the velocity of the wind until a maximum velocity is reached.

Fair of the American Institute.

We continue our notices of this exhibition, including in the present article mention of motors, working machinery.

The Otto Silent Gas Engine is an attractive exhibit. In this engine air and ordinary illuminating gas are induced to the cylinder in exact proportions, to make perfectly explosive mixture. The cylinder being filled with the mixture, the gas is then compressed

by the return of the piston. At this stage it is exploded by the opening of a small port which communicates with a gas flame. The expansion of the carbonic acid gas heated by the sudden combustion is very powerful, and the pressure driving the piston forward, the gas expands down to atmospheric pressure, and the return of the piston pushes it out. The power is then applied at every fourth stroke, or once in every two revolutions. Thus the cycle of operations is as follows: The cylinder takes gas and air on its front stroke, and compresses the gas during the next back stroke; the carbonic acid gas heated by the sudden combustion and exhausts the carbonic acid gas during the next back stroke. This fitful application of power necessitates a heavy fly-wheel and greater strength of parts than is required for a steam engine, and the cost of the engine in proportion to power, as well as the cost of fuel, is greater than that of a steam engine constantly run through an entire day, it being, with gas at New York prices, about \$1.50 per day of 10 hours for an engine rated at 1 H. P. There are, however, great advantages in this motor for many situations. It may be set in operation without delay, and stopped as often as needful without waste; and it is perfectly safe in all situations, and under the most unfavorable circumstances. The absence of boiler and other appurtenances necessary to the production of steam power, also offers the greater cost of the engine proper, and there being no necessity of an engineer to attend it, the increased cost of fuel, and the saving of water. We consider this the best of all this class of thermo-dynamic motors which has come under our notice. This engine is exhibited by Messrs. H. S. Manning & Co., of 111 Liberty Street, New York.

The Rider Compression Pumping Engine, a hot-air motor, is shown by Carney & Sayer, of 93 Liberty Street, New York. This engine has had a remarkable career of success, partly on account of its intrinsic merits, and partly on account of energy and business sagacity shown in its introduction to the public. It has been awarded medals at a great many American and Foreign exhibitions, including the Paris Exposition of 1878, and the Centennial Exhibition of 1876. Safety, simplicity, noiselessness, economy, absence of any offensive odor, the obviation of any necessity for an engineer to run it, no increase of fire risk, compactness, ease with which it can be started, and the facility with which it can be stopped, are among the qualities which have distinguished with stopping the engine, accessibility of all parts, external or internal, and its effectiveness in proportion to fuel consumption, are its notable points. It is adapted to any and all situations where water is to be raised, and is probably the widest used motor of its class in the world.

The Brown Caloric Engine is shown by the Progress Machine Works, Nos. 57, 59 and 61 Lewis Street, New York. This engine is suitable for use as a general motor for all purposes of driving machinery, as well as pumping, within the limits of the power developed. The highest capacity yet produced is, we believe, 14 H. P. The engine exhibits many meritorious features, in its workmanlike design, and in the simplicity of its construction. All the shaft-rods and bearings are either of cast steel or case-hardened. The prominent features are the isolation of the heater or furnace from the working cylinder, the isolation of the packings from heat to the utmost possible, the independent operation of the inlet and outlet valves, whereby expansion can be carried to any desired extent, noiselessness in operation, and facility in starting and stopping. The engine is supplied with the operation of the engine. These engines have been found specially adapted to the wants of the U. S. Light-house Department, and many of them are in use for light-houses and light-ships. They are also employed in the light-house service of England and Germany, as well as in many private establishments in this country and abroad. We regard this motor as the best of its class for general service.

This establishment shows in the same enclosure a balanced pulley which is worthy of attention, it is made with straight spokes, and in two equal parts, being divided diametrically through its fly, centre at the top and bottom spokes. The pulley is bored to fit the shaft and is attached there by being bolted together, which clamps it firmly. The finish of the faces of these pulleys is excellent, and the whole construction gives evidence of engineering skill. This establishment also shows the well-known and popular Ang. P. Brown's Safety Steam Engine Governor, and Patent Safety Water Gauge. These excellent and popular appliances are too familiar to the American steam-using public to need any further notice.

WOOD WORKING MACHINERY.—The principal engines are those of Mr. P. Prybil, successor to First & Prybil, of this city; Mr. John A. White, of Concord, N. H., for whom Mr. J. H. Blaisdel, of 107 Liberty Street, New York, is the general agent; and Messrs. J. B. Smith Machine Co., of Smithville, N. J.

Each of these enclosures makes a very creditable display. We shall barely be able to glance at their exhibits.

Mr. Prybil shows band-saw machines, Nos. 1, 2 and 4, as per his catalogue, well designed and handsomely finished machines; No. 2 having box frame, and both provided with patent improved slide bearing for the saw, by which it is steadied, and its liability to break is much lessened, and with many other meritorious features, which our limits forbid us to mention. In this machine we also noticed a jig-saw machine adapted for inside or outside sawing. The lower bearings are secured by a jam-screw of special construction, by which means these bearings are prevented from coming loose from the vibration. A brake is attached to the belt-shifter by which the machine may be instantly stopped. The tension is obtained by steel pointed wood levers, with brass sockets and rubber cushions. The circular saw table illustrated in No. 20, current volume of the SCIENTIFIC NEWS, also forms a part of this exhibit. One of these has two saws, one for ripping and the other for cross-cutting. One size of these machines is also made with a box frame for ivory, horn or shell work, where the wastage requires preserving, and the saw may run in water. A pony-planer for furniture makers, and for fine work, is also shown by this firm. The capacity of this planer is 24 inches in width, and from $\frac{1}{8}$ of an inch to 5 inches in thickness. It is a beautiful machine with a strong and simple design. It has a double feed, and a table adjustable for thickness of work, which comprises a scale by which the thickness may be exactly graduated. This firm also has in stock a fine work lathe, which is made to plane a hollow or a solid work. The machine does many times the work that can be done by hand, and of a superior quality. A double-spindle boring and mortising machine, a vertical boring machine, and a fine work lathe machine and wood-turning lathes complete the list of the machines in this enclosure. The lathes are especially fine.

In the enclosure of the H. B. Smith Machine Co. are some fine machines. One of the most important is the moulding machine, B-8 inch, of their catalogue, which cuts any moulding that can be worked on any machine, and is driven by belts by $\frac{3}{8}$ inches thick. It will also dress flooring and sheathing, planing both sides and tonguing and grooving up to 8 inches in width over all. It is entirely of iron and steel.

The other machines in this enclosure are planing, and lined with the best of babbit metal. The cutter shafts are of steel. The cutter heads are steel castings, slotted to carry two knives. The table is raised or lowered by means of a single screw, and firmly clamped to the frame at any desired point. That part of the table, or bed, beyond the under cutter is independently movable up or down, in order to receive the finished work properly, and can be swung to one side, when it becomes necessary to arrange or sharpen the lower cutters. This part of the bed and the under bed are also adjustable vertically together, that any required cut may be taken on the lower side of the sick. The upper head is movable across the bed. The outside head and head-stock are adjustable to and from the frame or fence, and can be inclined to any required angle. The throats of the under and inside heads are also adjustable. Properly arranged pressure-bars, gauges and springs hold the stock firmly to the bed at all points. The feed is powerful, with upper and lower feeds 44 inches in diameter. The upper is fluted and heavily weighted. The feed motion may be started or stopped by the operator at any moment. Also a planing and matching machine is also shown in this enclosure, which is a splendid design and workmanship, but which we cannot speak of more at length.

A heavy resawing machine is a remarkably fine exhibit. The frame is heavy and the metal distributed to give utmost rigidity. The machine does not essentially differ from the heavy resawing machine heretofore manufactured by this firm, except in its design, which is a decided improvement. It is doubtless as complete a machine as has yet been put in market, and it is claimed that it will do some work that can be done upon no other machine. The upper and lower feeds are of 6 inches in thickness, and do it accurately; or the feed works can be made yielding on either side, so as to take up any thickness required, the opposite side yielding to all inequalities. The rolls can be set at an angle, never required, always working freely, and adapting the machine especially for weather-boards, etc. Other points of superiority claimed for this machine are as follows:

The arrangement of the feed-works is very powerful, having four rolls, with power applied to

them all. The guides on which the rolls rely are long and accurate, and being placed on a level with the point at which the lumber enters, prevent that tendency to bind which results from placing the guides below the rolls, as is done in other similar machines. This freedom from binding is still further increased by using the universal joint connection and stationary gearing, instead of sliding level gears. The latter, on account of the long leverage which the rolls have upon them, are apt to bind and cut their spindles shut seriously.

Level gears, to be durable, should not only be properly made, but on account of their peculiar form of teeth, should always be in proper and perfect connection; this can only be attained by placing them accurately parallel to the axis of rotation.

There are some other good exhibits in this enclosure which we are compelled to pass by with merely an enumeration. They are a rot and dovetail machine, a 36-inch wheel band-saw machine, a blind-stile mortiser, a foot mortiser, an improved panel-raising machine, a lath and picket nail (a superior machine), a wood turning lathe and a heavy chisel beam vice (a powerful tool), and a universal saw bench, presenting valuable features, and a heavy power mortiser, which, as it comprises some new features, we will describe more at length.

The crank shaft is provided with an outside bearing, strengthening the shaft and crank pin, steadying the stroke, and by means of the outside balance increasing the efficiency of the machine. There are but the joints between the point of application of the power and the chisel, and it is impossible to have less and allow the chisel to turn. By these means the antagonistic features of high speed and perfect motion, necessities in a mortising machine, are rendered consistent with one another. Thus excessive wear, jar, vibration and danger are eliminated or reduced to a minimum not before attained. The speed of the machine, by reason of the inertia of the table, reduces the jar upon the foot to a simple pressure. All boxes are of the best best metal, and, like all other parts of this machine, are made to gauge and can be changed and repaired. The bearing in the reversing cylinder is of babbit, or, at the option of the purchaser, made of bell metal, split and adjustable to keep the chisel steady.

The notice of machinery of this class in the other enclosures we must defer to a future issue.

American Ledger and Record Paper.

THE *South* pays a justly merited compliment to the paper manufactured by Captain Byron Weston, at Canton, Miss., particularly the ledger and record paper, for which this manufacturer has become celebrated.

Such paper requires special qualities, which are attained in this manufactory in the highest degree.

The *Journal* quoted says: "The methods introduced by Capt. Weston are indispensable to excellence of product, and consist in the possession of two large and completely appointed mills, designed and erected for this special purpose. They rest upon foundations of solid stone, and are of appropriate architectural design. In exterior they present a handsome appearance, and their brick walls form a marked contrast with the green foliage and the fresh lawns by which they are surrounded. Within they are supplied with a class of machinery appropriate to the work it is to perform."

"The first point to be considered, however, was an adequate water-supply; for it is not possible to make the highest grade of paper when this is wanting. Upon the lower side of mountains by which the mill is surrounded the most limpid water flows, but to provide against a possible scarcity in this important particular an artesian well has been bored, from which a bountiful flow is constant. The Hoosatic River and steam engines furnish power for driving the machinery."

The Byron Weston mills are run in connection, one being used as a rag mill and stock depot, and the other for molding and finishing. There are fourteen paper engines, four steam engines and three water-wheels. The entire establishment is engaged in making strong linen papers for record books, legal documents, ledgers and journals, and for purposes where great endurance is required. The paper is made of linen rag, new cloth and kiesel, and is made so clean and white that all chemical bleaching is not necessary. These chemicals injure the fibre of the stock, rendering it tender and causing it to grow yellow with age. Ample exposure to sunlight for several days, and the naturally pure paper produced is remarkably strong and durable."

"The Byron Weston papers have won the most distinguished honors wherever they have been exhibited, and are held in high esteem by officials having in charge important records. At the recent Centennial Exposition they elicited so much atten-

tion from the public and from experts as to lead a prominent foreign official in attendance. Sir Sidney Waterston, who visited the mills at Dalton and witnessed the interesting processes attending their manufacture. The Centennial judges accorded them the most honorable awards, while at Paris, in 1878 they not only bore away the grand prize gold medal, but were awarded the medal of honor and perfection, a distinction conferred on no other similar exhibit."

"The invaluable qualities which distinguish the Byron Weston papers are largely the result of body, adaptability to every climate and to any kind of ink. Every sheet is water-marked and dated. It has a fine surface for writing and will admit of erasures without impairment. It has been widely introduced; and so great is the satisfaction which it gives, that the demand is constantly enlarging, and it cannot be doubted that when its transcendent merits are fully understood it will be the means of conferring still wider public benefits."

Armstrong's Improved Chains.

SIR W. G. ARMSTRONG has recently obtained a patent for an improved method of making chains, such as are used for suspension bridges or for bracing purposes. It is thus described in the *English Mechanic*: "The bar for each link of iron is rolled continuous length, and the process is similar to that employed for rolling continuous wheel tires. The circle may be made of any convenient size, and the larger the better, consistently with the chain having the least weight for the purpose for which it is intended. The circle is then flattened so as to bring it into the form of a link with its sides parallel to each other, and its ends rounded to correspond to the inner surface with the diameter of the connecting pin or bolt. The patentee prefers to flatten the circle by pressing the sides inwards, whilst at the same time the circle is distended between two pins or bolts of the same diameter as the pins to be used in making up the chain. This operation is best performed whilst the metal is hot, and care should be taken to avoid as far as possible alteration in the sectional form of the metal. The links are afterwards brought to the exact length required by stretching them by hydraulic or other power to a standard gauge of length. The links are then heated in a furnace, and the links should remain in the stretcher until cold. The links should be supported whilst exposed to the strain by a block inserted into them of a thickness equal to the diameter of the pins. If care be taken in rolling the circles on a small amount of extension will be required to adjust them to the standard size. The object of this mode of construction is to make a chain of endless bars without welds, and to require the longitudinal force of the material lying in the most favorable direction, both at the sides and ends of each link. The links are formed into a chain by arranging them side by side with interlocking ends, and passing a connecting bolt through them, so that each successive link shall bear against opposite sides of the bolt. To form a symmetrical chain an odd and an even number of links may be employed alternately, and the links may be varied in transverse section so as to afford the required tensile strength in each set. In chains for suspension bridges in general, the strength of the chain would diminish from the pier to the centre of the span. The pins should be of such a size as to ensure rigidity and avoid excessive pressure in the bearing parts. The projecting ends of the pins may receive screw nuts. This method of manufacture admits, it will be seen, of the use of qualities of metal in which links cannot be securely and advantageously closed by welding."

Balloons for Arctic Exploration.

TO THE EDITORS OF THE SCIENTIFIC NEWS:

THE papers throughout the country are agitating the idea of using balloons in order to reach the north pole. I am inclined to think that I first suggested the idea of making use of balloons for this purpose. Among the various plans for inflating these aerial sails, it occurs to me that the plan originally used would be the most expedient and convenient—*i.e.*, rarefied air. Could not a barner be so contrived to heat and rarefy the air inside of the balloon sack without endangering the life? Kerosene oil would perhaps be the best fuel that could be used. Whenever the explorers met with obstructions to the progress of their sleds, boats, etc., it would not be a difficult matter to inflate a sack with rarefied air, and thus get buoyancy to help them over the obstructions.

J. B. POOL.

West Pittsfield, Mass.

Continued from page 241.

There being considerable motion on the water, it was hung from two booms to keep it off the ship's side till it was ready for sinking. The stage having been brought up and adapted to fit the box, it was secured to it in a convenient position for the divers; the chains for securing it in place were all properly fastened to it, the lengths of each being marked with painted links, and with the exception of three of the lightest on each side they were coiled in place ready to be loosed out. The additional weight required to sink the box was made up with sacks of sand secured to the outside in such a manner as to be clear of the chains and easily cut away. It was then sunk and drawn up into place with ten chains on each side, with a heavy strain on each.

The pump was then started, and all defective parts on the upper edge of the box were calked with oakum under the second layer of canvas, which was now nailed down. In three hours and a half the water was pumped out to the lower platform, about 4 feet above the ship's floors, the ship altering her trim and lightening her draught aft by about 10 feet; in pumping the remaining water considerable difficulty was experienced in keeping the rose of the pump clear on account of the debris of broken cargo, hay, potatoes, etc. When pumped as dry as possible, the box was secured to the hull

ing the tip of the blades an inch in either direction decided and sensitive helm was felt.

We invite the attention of our readers to the advertisement of the Wells Two-Piston Balance Engine, which may be found in another column. Certain advantages are obtained in this engine which are fully set forth in an article on the subject, published in No. 12, current volume, to which the reader is referred.

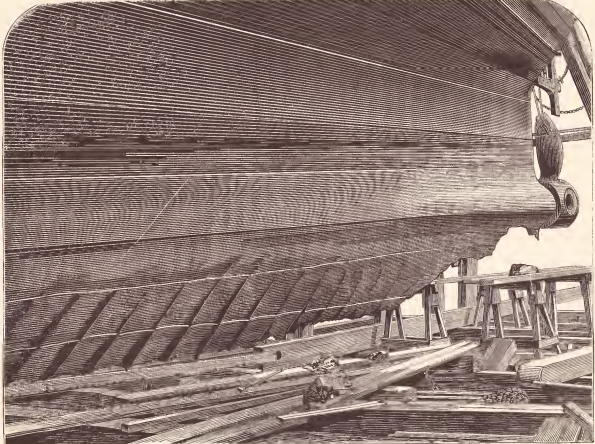
Wail of Distress from England.

A LABORING man, writing from Manchester, England, to the *Evening Post* speaks thus concerning the royal commission that has just been organized to report on the depression that prevails so extensively in the agricultural districts. Its members are made up of nothing else scarcely but dukes, earls and landed gentry. Not a single small or working farmer or practical agriculturist appears on the whole list, so you may be sure that the members of this commission are no more competent to report on our agricultural depression than our farmers are to compete with dukes and earls at a cattle show. I take it that if a royal commission were organized to report on our manufacturing depression, we

from a home wherein I had dwelt these last fifteen years in order to get under much less rent. Yet in comparison with many I have much cause to be thankful, for besides these "abominable" letters with which I trouble yourselves, I have got an appointment as a collector for a little local burial club, which fills up a good deal of spare time, and also gives me a much-coveted opportunity of visiting some scores of workmen's dwellings weekly, by which means I can soon gauge the condition of the labor market, especially among the poorest portion of our population.

But Manchester and district is not alone, evidently, in all this distress, for the "canny," thrifty Scots have been breaking out into bread-riots and plundering the provision shops, while Ireland is looking ahead in absolute horror at the coming winter, and calling upon her governors to begin public works of some description, in order to ease down the hardships of the coming famine. Meanwhile, in the belt of towns surrounding us in Manchester here—Oldham, Ashton, Salford, etc., on one side, and extending to Preston on the other

—the factory owners are issuing notices of another reduction of wages, which means the fourth reduction that has been imposed this year. Of course there is the usual "striking" going on, but it is only like striking your head against a stone wall—the wall can stand what the head won't.



RESCUE OF THE S. S. "COLOMBIA."—FIG. 2.

with bolts wherever it was possible to get them through the plates.

As a precaution, should any accident happen to the box during the long tow of 700 miles to Callao, which is the longest on record under similar circumstances, the lower platform was calked and shored down, and a strong bulkhead erected at its end, but fortunately this was not required.

On Sunday, the 1st of September, everything was completed, chains secured for good, and all made snug, and we left Ballenita in tow of the Santiago bound for Callao, which port we reached without the slightest casualty on Saturday, the 7th of September, at 1 P. M. During the voyage the box did not make any more water than could be pumped out with the engine-room donkey pump working a few hours daily, a suction pipe from which had been led into the box.

A peculiar incident happened in steering the Colombia on her way to Callao. The propeller, a left-handed one, had but two out of the four blades remaining, and they being at right angles to one another, were set, prior to our leaving Ballenita, one on each side of the stern-post, pointing upwards. When under way the ship carried a strong port helm—that is, she ran her head across towards the starboard quarter of the Santiago; by turning the propeller so that one blade was almost plumb and the other square out on the port side, the ship steered in the wake of the Santiago, and by mov-

ing the tip of the blades an inch in either direction decided and sensitive helm was felt.

However, if any one would only go to the trouble of making the comparison, it would soon be found out that there is far more distress in our manufacturing districts than there is in our agricultural districts, for despite the warmer weather, which finds some men more outdoor work, there is still a deep and widespread distress among artisans in other trades. I myself know many mechanics, engineers, factory-workmen, shoemakers and others who have always been able to earn at other times from thirty-five shillings to two pounds a week, but who are now working for six shillings a week—half food, half money—at a large storeyard, set apart for able-bodied paupers at the outskirts of our city. And scores of these men are sickening such a length of time in these starvation situations, that our Board of Guardians have had to give them very strong hints that they must not settle down or stay too long at these jobs, or they (the Guardians) will have to break up their homes, and place both themselves and their families inside the workhouse.

Of course it must not be thought that I myself escape scot free from this universal "pressure of the period," for I have had to retrench in many ways, and within this last few weeks have had to remove

Importation of Gold.

THERE can hardly be a doubt that the Bank of England will make a strong effort to stop the flow of gold to this country, should it continue during the autumn months. The recent dispatches from London seem to substantiate this opinion. The Imperial law of supply and demand, however, will attract the precious metal from foreign holders, despite the opposition of combined capitalists. For the week ending the 1st inst. the actual gold value of the exports from New York foots up the handsome sum of \$9,982,608, the largest of any week on record. It was this, in the main, which recently broke down the rate for foreign exchange. At the date of this writing (Sept. 5th) there are no new consignments reported of gold from London or Paris to New York, but gold previously sent is arriving. Two steamers brought in \$2,400,000 gold bars and French coin in a single day. It is estimated that not far from \$20,000,000 gold has thus far been started from Europe for New York; about two-thirds of this amount has already arrived. The value to this country of having its currency at par with gold ought to begin to be apparent to even the dullest of the advocates of a non-exportable and a non-importable currency like irredeemable paper.—*Rhodes Journal*.

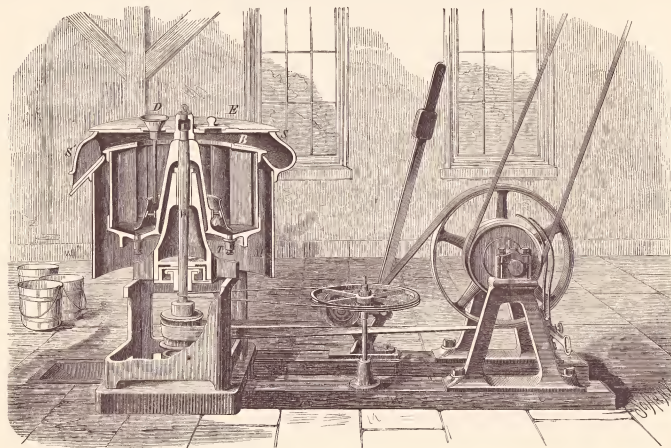
HASTE makes waste. HURRY makes worry.

Faber's Talking Machine.

A TALKING MACHINE was recently made by M. Faber. M. Gariel writes of it in the *Journal de Physique* that it consists essentially of three parts—a blowing arrangement, an apparatus for producing sound and an articulating apparatus. The first sends a current of air through the *larynx*. This latter is an iron reed, the length of which can be varied within certain limits so as to change the pitch of the sound (M. Gariel thinks a system of membranous reeds would have been better). The articulating apparatus comprises a part for producing vowels and another for consonants. The former operates by passage of air through apertures of various forms in diaphragms, which are successively placed in the passage of the air-current by levers worked with keys; a special cavity, which can be connected with the other, produces nasal sounds; the communication is effected at will by means of a special lever. The consonants are given by pieces whose action is very similar to those of the lip, the teeth and the tongue. A special drum produces the R sound. All these pieces and organs are put in motion by fourteen keys, which are very ingeniously arranged so as to cause to act, with suitable intensity and in the proper order, the organs meant to produce a syllable. Fourteen keys are sufficient, because with the help of accessory keys one can vary the character of consonants from strong to weak, etc. The speaking of the machine is necessarily monotonous (M. Gariel says), and not perfect; certain sounds produce a better effect than others; still, in general, one can comprehend the words and phrases pronounced. The machine is interesting, as showing distinctly the mechanism of phonation, which has been thus reproduced artificially, and therefore obeys absolutely the laws of acoustics.

The Centrifugal Milk Skimming Machine.

We gave a description of this ingenious machine on page 187, current volume of the *SCIENTIFIC NEWS*, and we herewith present a full engraving of it, referring to our former description, in which we only presented a sectional diagram. We judge this machine may find an extensive use, were it only for the purification of milk, which, if the reader will re-peruse our former description, he will find it accomplishes in a far more perfect manner than can be done by the usual process of straining.



The Stylographic Pen.

THE accompanying engraving illustrates one of the penholders which we are this year offering for subscription. We have selected it as the *re-plus ultra* of fountain pens, and certain to give satis-

faction in use, basing this opinion upon personal use in our office for several months.

These pens are supplied to us, and will be supplied to any who order them, by Robinson and Winthrop, of 169 Broadway, this city.

The faults of previous and contemporary fountain pens, and their uncertainty of action, are obviated in this pen. The ink never flows when not wanted, nor fails to flow when desired. It writes smoothly and easily, and is very agreeable to the hand. The prominent features of the pen are a stylus or point which in use constantly vibrates longitudinally in its sheath, thus preventing the



possibility of clogging, and the control of the flow of the ink by air pressure, which acts either to hold the ink in the pen beyond possibility of leakage, or nicely graduates its flow to the exact requirements of the writer. The pen is adapted to use any kind of ink whatever, and with ink specially prepared for sketching is an admirable implement for free hand drawing. It is also excellently adapted to book-keeping, as it not only writes a graceful, uniform text, but it may also be used to rule uniform lines, without the slightest danger of blotting even with the thinnest ruler, even the edge of a business card answering for this purpose. Full directions for use accompany each pen.

Screws versus Paddles.

UNDER this title the *Engineer* has recently made an elaborate comparison of the relative merits and demerits of these two classes of propellers, not favorable to the former. After pointing out the many defects of screws, and stating that they waste from 40 to 60 per cent. of the power applied to them, mainly through friction, but also from other well-known causes, it continues as follows:

"Let us now compare the waste of power of the screw with that of the paddle. Nothing like the attention which has been devoted to the screw has been paid to the paddle. We never yet heard it asserted that a good feathering paddle wheel wasted 50 per cent. of the power applied to it. On the contrary, it is usually asserted that paddles waste not more than 18 to 20 per cent. Not many experiments of a trustworthy character have been made to settle the point. In the trials of the paddle steamer 'Alectro,' made to test her effi-

ciency as compared with the screw propeller fitted to the 'Rattler,' almost 82 per cent. of the whole power of the engines was utilized, and it is worth adding that 77 per cent. of the power of the 'Rattler's' engines was also realized—a very different value from that assigned in the present

day to screw propellers. If, now, it be really true that the screw wastes 50 per cent. and the paddle wheel only, let us say, 20 per cent. of the power developed, is there not reason to think that a mistake has been made in discarding the screw and adopting the paddle under circumstances where the use of neither is absolutely dictated by necessity? Let it be supposed that with the paddle wheel 100 tons of coal will do as much as 160 tons with a screw, and it becomes evident that the advantages possessed by the screw must be great indeed to enable it to compare favorably with the paddle. It may further be pointed out that much of the advantage

once possessed by the screw over the paddle was derived from the special intrinsic merits of the screw engine; but high pressure, compound paddle engines are now common, which burn as little coal per horse-power as those of any screw steamer. It may be answered to all this that the paddle wheel is not more economical than the screw, and to this aspect of the whole question we would direct particular attention. If it be conceded that the paddle wheel wastes just as much power as its rival, then we are face to face with certain curious speculations. The paddle wheel drives water straight astern, not to one side, like the screw. Therefore it moves water astern parallel to the keel, or in the most favorable way. Its thrust on the water is direct, not oblique. It does not interfere with the currents under the stern to anything like the extent to which the screw interferes with them. The floats of a well-made paddle wheel enter and leave the water perfectly perpendicularly, and with little resistance. The fluid frictional resistance of the paddle wheel can be as nothing compared with that of the screw. How, then, does the paddle wheel come to waste 50 per cent. of the engine power? Does a well-made screw really waste 50 per cent. of the power of the engine? Lastly, if the paddle wheel and the screw propeller are both equally inefficient, how is this explained, seeing that the two instruments are so totally dissimilar in construction, and so unlike in their mode of acting on the water? Answers to these questions will, we fear, be sought in vain in the library. If satisfactory replies cannot be given by those who have made practical experiments and have hitherto held their peace, then they cannot be had at all.

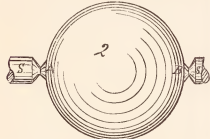
Ball Turning by Hand.

BY JOSHUA ROSE, M.E.

METAL balls, to be turned true, should be cast with two round stems to receive centres, and enable the roughing out of the balls with slide rest tools and

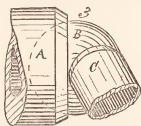
by hand tools. As a guide in roughing them out a gauge of sheet iron formed as shown in Fig. 1, is employed, the curve A being struck with a radius slightly larger in diameter than the required diameter of the finished ball. This is necessary, be-

cause otherwise the corners at B, C, would not meet the work until the latter was reduced to its finished size, whereas a little metal must be left for subsequent operations. When the ball is roughed out the stems are nicked as shown at A, B, in Fig. 2, so that they may be broken off. The nicks A,



B, should not be made too close to the ball, or in breaking them off the metal may tear out at A, B, below the circle of the ball, and spoil it if its diameter must be to standard size, or cause extra labor in reducing the size of the ball. The projections left after breaking the stems off should be filed off the ball, using the gauge shown in Fig. 1 as a guide. To finish the ball it is chucked in a chuck composed of equal parts of lead and black tin.

After the ball is thus chucked, the hand tools must be applied, thus for wrought iron a graver or for brass a scraper, the old turning marks being very nearly effaced. The part of the ball last turned should then be placed in the chuck and the remainder trued as before. The ball should then be secured in the chuck so that the next turning marks will cross those already made on one-half of the ball, and the ball again reversed, so as to bring the surface last turned within the chuck; these successive chuckings being continued until taking a very light cut, the turning tool marks show the ball to be true. To finish the ball the cuttershown



in Fig. 3 is employed. It consists of a cast steel tube, hardened and ground out cylindrically true (with a lap) afterwards and fitted to the wood handle B. The end of this cutter is ground off at an angle at A, the cutting edge being at the bore. This tool is employed as shown in Fig. 3, the ball being constantly reversed in the chuck as explained for the hand tool operations. While cutting the ball cutter should be rotated right and left, while its position should be altered by swinging the handle B from right to left and from left to right.

It is an excellent plan to have two ball cutters, one for roughing out and one for finishing, the former having its end face at a slight angle, so that at the plane of that face the hole will be slightly oval. This will reduce the length of cutting edge that will come in contact with the ball and enable the cutter to cut more freely. The latter should have its end face ground at a right angle to the axial line of the bore, and should be used under a light pressure, while the ball should be frequently altered in its position in the chuck. The latter should have its end face ground at a right angle to the axial line of the bore, and should be used under a light pressure, while the ball should be frequently altered in its position in the chuck. The latter should have its end face ground at a right angle to the axial line of the bore, and should be used under a light pressure, while the ball should be frequently altered in its position in the chuck.

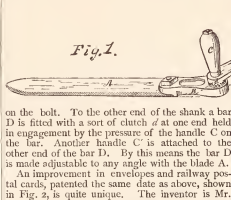
The bore of the cutter should be about, or a little more than, one-half the diameter of the ball.

Recently Patented Inventions.

UNDER this heading we propose, from time to time, to publish engravings and short descriptions of some of the inventions patented in this country. Many of them will be of articles designed for domestic use, hand implements, etc.; but we shall endeavor in each selection to give something which is of interest on account of its usefulness, suggestiveness, or its unique character.

An improvement in knives for cutting hay, patented Oct. 14th, 1879, by Henry Fisher, of Canton, Ohio, presents some novel features in this class of

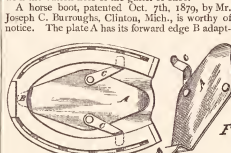
implements. It has a reversible blade A, actuated by a single bolt to one end of a shank C, formed in such manner as to prevent the blade from turning



on the bolt. To the other end of the shank a bar D is fitted with a sort of clutch *d* at one end held in engagement by the pressure of the handle C on the bar. Another handle C' is attached to the other end of the bar D. By this means the bar D is made adjustable to any angle with the blade A. An improvement in envelopes and railway postal cards, patented the same date as above, shown in Fig. 2, is quite unique. The inventor is Mr.

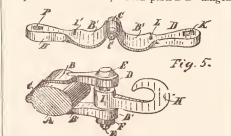
Henry B. Maxwell, of Chicago, Ill. It consists in an envelope or railway postal card having its surface coated wholly or in part with a substance suitable for constituting the portion so coated a tablet or slate, upon which matter may be erasably written. This enables the envelope or card to be repeatedly used for railway messages, etc. An improvement in button-hooks, patented Aug. 12th, 1879, seems to add to the convenience of that useful implement. It is constructed with the ordi-

nary hook, to engage with the button, and with a second hook, adjacent to the first, adapted to engage with the button-hole of the gaiter or shoe. A horse bolt, patented Oct. 7th, 1879, by Mr. Joseph C. Barroughs, Clinton, Mich., is worthy of notice. The plate A has its forward edge B adapt-



ed to rest on the shoe so as to provide a cavity or space between the plate and the under side of the horse's foot, and is provided with pivoted arms C adapted to rest on the shoe near the heel of the same.

Mr. John H. Harford, Indianapolis, Ind., has patented a whiffletree clip, shown in Fig. 5, which is composed of the broad, curved parts B' B'' hinged



together at C, and having projecting jaws D D', provided with holes K P, which receive the bolt E. This bolt is employed to clamp the curved parts B' B'' firmly together on the wood A, and also acts as a pivot for the trace-hook H.

A post-hole borer, the invention of Hiram K. Needham, of Denison City, Texas, patented Oct. 7th, appears to be an effective implement. The blade A, Fig. 6, is formed of a single metallic plate rolled in triangular circular form, having its forward portion shorter than its rear portion, of the



shank secured to the latter, the forward sides of said blade overlapping at their upper extremities,

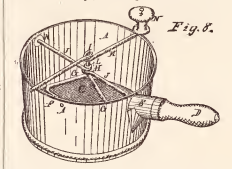
and then extending diagonally downward and rearward in opposite directions to form the single rear entering-edge. The spring-like action of the overlapped part serves to hold earth and facilitate its removal from the post-hole.

An improved snap-hook, which appears to supply an absolutely certain attachment to a ring or loop engaged with it, is shown in Fig. 7, and is the invention of Mr. John Spack, of St. Louis, Mo., who patented it Oct. 7th, 1879. This hook A has a hinged latch-piece C, having a nick at *c* for the engagement of the spring D, and a thumb-piece E, by which the latch-piece may be pressed into position to allow a ring to pass by it out of the bend of the hook. In the position shown in the



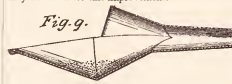
engraving the latch-piece is locked by the spring. The ring passes readily into the loop of the hook, but cannot get out unless, first, the thumb-piece *c* be pressed and then the spring D be moved out of its engagement with the nick *c*.

Fig. 8 shows an improvement in sieves patented by Mr. George W. Lane, of Rockford, Ill. It is provided with a handle D, inserted in a socket E, in the side of the hoop A, which enables the sieve to be used as a scoop; but the patented feature is the



detachable reel, F, G, H, I, J, K, etc. The bar J supports the other parts of the reel in a vertical position, the crank M extending over and resting upon opposite sides of the rim or hoop. Springing the hoop enables the bar J to be taken out of or put in sockets H, formed on or attached to the inside of the rim.

A combined grocer's scoop and funnel, patented by Wm. S. Chilis, of Forkland, Ala., is a very handy implement for use in weighing and putting up in paper bags such articles as tea, coffee, spices, etc. Ordinarily two separate implements are required for this purpose, a scoop and a funnel; but with this improvement the article to be weighed may be placed in the scale-pan, and without changing hands or implements may be introduced into the bag. There is no doubt that a wide sale may be found for this improvement.



The manufacture and sale of such inventions as we have herewith illustrated and described form, and will always form, a large part of American industry, and very handsome returns have often been made to their inventors.

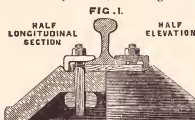
American Cars.

AT West Troy, in New York State, there are some very large car factories which appear to be in a flourishing condition, and horse-cars are sent from them to Germany, Brazil, Jamaica and Bombay. The Bombay Tramway Company have been sending orders since 1872. It began in ordering twelve cars here and twelve in England at Birkenhead; but it evidently was found that the American cars were superior, which they undoubtedly were. In a correspondent's interview with the manager of West Troy, the latter gave him some of the reasons why America makes a better car than England. He explained that the English horse-car weighs one-fourth more than the American car, and ultimately gives way in the joints, while those made in this country are light and strong; on the same principle that an American made carriage, though lighter, can stand more wear than an English carriage, which is altogether too heavy, and apt to break, owing to its weight. I asked him why English manufacturers, having learned of the success of American cars, did not

imitate them, and he readily replied, "Because they have not the confidence in themselves. A man using in the streets of London such a light wagon as American ingenuity now produces, say one weighing not over 125 pounds, would be at once arrested. The idea of making anything light, neat, and yet strong, is characteristically American, and that same principle holds good in the manufacture of horse-cars, and they appreciate it. There are car shops in Europe, and large ones, too, at Birkenhead, Brussels and Hamburg, and they have begun to make them in Paris, as the duty on cars imported into France is very heavy; but in Germany it is only 6 per cent., and everywhere the American horse-car is preferred. Nothing made of wood and iron requires so much care and labor as these very cars, and I think that in their manufacture this country has really reached perfection."—*N. Y. Herald.*

Toughened Glass Sleepers for Railways.*

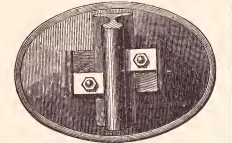
The glass is moulded into various forms to suit the different requirements, the cooling of the glass



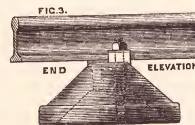
being so regulated that the radiation from each point of the surface corresponds to the thickness of the glass, thus enabling the casting to be equally affected throughout when undergoing the tempering or hardening process. The regulation of the radiation or absorption of the heat in the thicker parts of the casting is done by having iron moulds hollow, and by circulating cold water or cool air at those points where the glass is thickest, so that the casting cools equally all over.

The mode of toughening the glass is both curious and instructive, affording, as it does, a complete contrast to that of steel. The glass is heated to a high temperature and then plunged into a bath of cool oil or other liquid, the result being that the

FIG. 2.



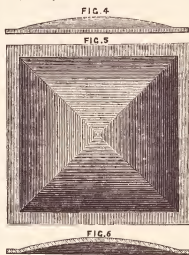
glass becomes converted from its own characteristic brittleness to the remarkable tough fibrous material known as toughened or tempered glass; but to produce the desired effect and obtain the full advantages of the toughening process upon articles of great strength and thickness, Mr. F. Siemens has found that the hardening or tempering can be effected in the moulds themselves: Firstly, by carefully protecting the glass from coming in direct contact with the metal mould, to prevent the chilling of the surface of the glass; and, secondly, by the use of the hollow moulds before spoken of, for maintaining a uniform temperature all over the casting during the hardening. The temper is modified in these thick castings by passing them through an annealing oven.



The moulds are chiefly protected by layers of wire gauze, perforated metal, or plaster of Paris, varying in layers or thickness according to the rapidity and energy required in tempering, with the nature and composition of the glass—the energy being increased at the thick parts of the casting before alluded to by the circulation of cool water or air

through the cast iron hollow mould. So far as experience has shown, all kinds of glass are equally affected by the process.

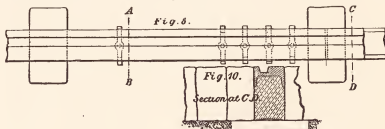
The toughening process, as well as the hollow moulds, are the patent of Mr. Frederick Siemens, of Dresden, and recently brought by that gentleman to great perfection by the simple and inexpensive means above alluded to. The first cost of this specially prepared material will not exceed that of cast iron, but the specific gravity of glass is only one-third that of iron, and its strength for all practical purposes is as great. A large output is anticipated, and in this way it is calculated that the first cost of glass will be considerably less than that of iron; and by a similar calculation can be shown



to be cheaper than wood. It is asserted that these glass sleepers will, as far as one is able to judge, last a very long time, being neither subject to corrosion nor decay. Under these circumstances, it will be unnecessary here to enter into any calculations to prove the enormous saving that will be effected in the maintenance and renewal of permanent ways. Such a fragile material as glass has hitherto been looked upon as useless for purposes

where great strength is required; but impossible as it may sound, the toughened glass is almost as strong as iron, whilst it possesses greater durability. Its qualities certainly deserve a fair trial and investigation, and the time may come when we shall see not only glass sleepers, but glass tools and implements, eaves troughs, or spouting, for furniture, and many other things.

Some of these glass sleepers are laid down upon



the North Metropolitan Tramway (shown in Figs. 7 to 10). They are laid longitudinally in 3 feet



lengths 6 inches by 4 inches, and are specially formed on the upper surface to allow of the rail exactly fitting. The average transverse resistance of the sleepers tested at Mr. Kirkaldy's works in Southwark, supported at 30 inches, was found to be about 4 tons.

The following are results of tests carried out at the works of Mr. William Henderson, of Irvine, N. B.

A falling weight of 9 cwt. dropped from a crane upon a glass plate 9 inches by 9 inches by $\frac{1}{2}$ inch laid upon gravel ballast 9 inches deep, with a wood cushion $\frac{1}{2}$ inch in thickness between the glass and the rail:

Fall 3 feet 0 inches without effect.

"	5	"	6	"	"
"	7	"	0	"	"
"	12	"	6	"	"
"	15	"	0	"	"
"	17	"	6	"	"
"	20	"	0	"	"

At this point the rail broke, and as the crane could not elevate the weight to a greater height, and a heavier weight was not available, a smaller section of rail was substituted, when the glass succumbed to a second application of the 9 cwt. dropped from a height of 30 feet. A series of similar experiments were made upon this occasion with more or less the same results. A $\frac{1}{2}$ inch cast iron plate 9 inches by 9 inches by $\frac{1}{2}$ inch, tested in the same manner and under similar circumstances, broke with a drop of 10 feet. Several samples and specimens are upon the table. Amongst which is a bowl sleeper (shown in Figs. 1 to 3), also a buckled plate for floors (shown in Figs. 4 to 6).

Mr. Bucknall proposes to make these sleepers out of blast furnace slag under Mr. Bashley-Brittain's process, combined with the toughening process of Mr. Siemens. After describing to the writer the difficulties he has had in getting his experiment carried out in England, the inventor mentions, among other things, that the glass-makers to whom he applied would not undertake any experiments unless all expenses were paid, and that the manufacturers would not make the moulds or presses for the process, but recommended other firms. On application to the pressmakers, however, he got a quotation asking between £70 to £80; and it was stated that it would take four months to invent, and that he must be responsible for any extra charges made. Under these circumstances, he says, "I gave up in despair; but having casually heard of the Siemens process, I got an introduction, and was put in communication with Dresden, and within a week found myself at the glassworks of Mr. F. Siemens, in that city. In another week a wooden model, which cost 2s. 6d., was produced, and an iron mould made from it which cost about 30s.; and two days afterwards I held in my arms the first baby glass sleeper; but so heavy was this first-born that it suddenly slipped from my grasp and fell with a heavy thud upon the flags. I feared for the safety of my darling's carcass, but upon

careful examination I found it to be unimpaired. There its longitudinal form lay upon the ground, not dead, but a veritable sound sleeper, still living, and probably worth more than a dozen dead ones."

Whether Mr. Bucknall succeeds in making railway sleepers or not, if this toughened glass be really as sound and good as is claimed, it must succeed by numerous purposes.

Oat-Meal as a Food.

OAT-MEAL is a food of great strength and nutrition, having claims to be better known and more widely used than it is at present. Of much service as a brain-food, it contains phosphorus enough to keep a man doing an ordinary amount of brain-work in good health and vigor. All medical authorities unite in the opinion that, eaten with milk, it is a perfect food, and, having all the requisites for the proper development of the system, it is a pre-eminent food for growing children and the young generally. Oat-meal requires much cooking to effectually bust its starch cells, but when it is well cooked it will thicken liquid much more than equal its weight in wheaten flour. The oats of this country are superior to those grown on the continent and the southern parts of England, but certainly inferior to the Scotch, where considerable pains are taken to cultivate them, and it is needless to point out that the Scotch are an example of a strong and thoroughly robust nation, which result is justly set down as being derived from the plentiful use of oat-meal. Dr. Guthrie has asserted that his countrymen have the largest heads of any

* Abstract of a Paper read before the Iron and Steel Institute at Liverpool, by C. Wood, C.E.

nation in the world—not even the English have such large heads—in which he attributes to the universal use of oat-meal; as universal it is, being found alike on the tables of the rich and on the tables of the poor—in the morning the porridge and in the evening the traditional cake.

A delicious dish for breakfast, to be eaten with cream and sugar, is made as follows: Take good oat-meal; let it soak over night in cold water, and then boil it for two hours in milk and water, before breakfast. The usual trouble about the use of oat-meal, is that it is served before it is properly cooked. In this case it is perfectly wholesome, and liable to irritate the digestive organs. Oat-meal porridge is made as follows:

To three pints of boiling water add a level teaspoonful of salt and a pint of coarse meal, stirring while it is being slowly poured in; continue stirring until the meal is diffused through the water—about eight or ten minutes. Cover it closely then, and place it where it will simmer for an hour; avoid stirring during the whole of that time. Serve hot, with as little messing as possible, accompanied with milk, maple syrup, or sugar and cream. To make oat-meal-cake, place in a bowl a quart of meal, add to it as much cold water as will form it into a soft dough, cover it with a cloth, and allow it to remain to allow it to swell, then dust the paste-board with meal, turn out the dough and give it a vigorous kneading. Cover it with the cloth a few minutes, and proceed at once to roll it out to the eighth of an inch in thickness and cut it in five or six strips; partly cook them on a griddle, then finish them by toasting them in front of the fire.

Controlling Horses by Means of Electricity.

The General Omnibus Company, of Paris, has for some time past, we learn from *La Nature*, made use of electricity for subduing vicious horses. At a recent *séance* of the National Society of Agriculture, M. Bella gave some interesting details on the subject. By the process adopted, intractable animals, given to biting, rearing, kicking, etc., are rendered inoffensive and submit peacefully to be groomed and harnessed. To obtain this result, a weak current of electricity is passed into the mouth of the horse each time it becomes restive. The will of the animal seems almost annihilated. The current is produced by a small induction machine of the Clarke system, the wires of which communicate with the cloth bridle. The idea of controlling horses by electrical means found expression in the Exhibition last year. In the Swedish section was an apparatus with this object. It consisted of a small battery, connected with a battery, the wires of which communicated with the bit by the reins. In case of resistance by the horse, the driver had merely to push a button, when a current passed immediately and the animal became docile. The employment of electricity is said to produce a sort of uneasiness or torpor, rather than pain, and is much less barbarous than many taming methods hitherto adopted, such as deprivation of food, fatigue, etc.

Fireproof Composition.

SEVERAL preparations for rendering textile and other inflammable fabrics incombustible and practically fireproof have been recently patented in England on behalf of MM. Martin and Tessier of Paris. The compositions are said to be of an inexpensive nature, and capable of rendering incombustible all kinds of readily inflammable substances, such as woven and other fabrics of cotton, and other fibrous materials, paper, printed or otherwise, including bills of exchange, bank notes, card tables, woodwork, theatrical scenery, straw, etc. The first composition, which may be applied to all kinds of fabrics without deteriorating them in any way, consists of—

Sulphate of ammonia (pure).....	8 Kilos.
Carbonate of ammonia.....	2.5
Boric acid.....	3
Borax (pure).....	1.7
Starch.....	2
Water.....	100

It is simply necessary to steep the fabrics in a hot solution composed as above, until they have become thoroughly impregnated, after which they are drained and dried sufficiently to enable them to be ironed or pressed like ordinary starched goods.

A second composition to be used for theatrical scenery (or the mounted billiard apparatus, gunnery furniture, door and window frames, etc., is to be applied hot, with a brush, like ordinary paint. It is composed of—

Boric acid.....	5 Kilos.
Hydrochlorate of ammonia or sal ammoniac.....	15
Potassic chloride.....	5
Gelatine.....	1.5
Size.....	50
Water.....	100

to which is added a sufficient quantity of a suitable calcareous substance to give the composition sufficient body or consistency.

A third composition, to be used for coarse canvas or sail cloth, cordage, straw and wood, is applied by immersing the articles therein or by imbibition, and consists of—

Boric acid.....	8 Kilos.
Hydrochlorate of ammonia or sal ammoniac.....	15
Borax (pure).....	3
Water.....	100
A fourth composition, applicable to all kinds of paper, whether printed or not, including securities, books, etc., is formed of—	
Sulphate of ammonia (pure).....	8 Kilos.
Boric acid.....	3
Borax.....	1.7
Water.....	100

The solution is to be placed in a vat heated to 50° C. (122° Fahr.) at the end of the paper-making machine, and the paper as it leaves the machine is passed through the solution in this vat, so as to be completely impregnated therewith, after which it is dried upon a warm cylinder and then wound up. If the paper be in sheets or in rolls, it is simply immersed in the above solution, heated to 50° C., spread out to dry, and afterwards pressed to restore the glaze destroyed by the moisture. The above compositions insure a degree of incombustibility without precedent in the regards the preservation of the materials to which they are applied. The proportions of the several ingredients are given as examples only, and may be varied as found necessary in practice.

Rubbish.

MOST of the substance we call the rubbish of our houses finds its way sooner or later into the dust-bin, and we are contented to lose sight of it. It is worthless to us, and we are thankful to be rid of it, and think no more of it. But no sooner does it reach its destination than our rubbish becomes a valuable commodity. The largest cinders are bought by laundresses and braziers, the smaller by brickmakers. The broken crockery is matched and mended by the poor women who sort the refuse, and the broken glass, which is quite worthless sold with the oyster shells to make roads; and the very cats are skinned, before their dead bodies are sent away with other animal and vegetable refuse to be used as manure for fertilizing our fields. Nothing is useless or worthless in the contractor's eyes, for rubbish, like dirt, is simply "matter out of place;" what is rubbish to one person under certain circumstances being, under altered conditions, extremely valuable to another. Gold itself is rubbish in the eyes of a man who is starving on a desert island; and the pearls which adorn a royal diadem and have made the fortune of the lucky finder, were probably felt to be as useless by the poor wretch who is tormented by the presence of some particle of matter which he felt to be decidedly "out of place" within his shell. Many a cock, no doubt, had washed the little fresh water bleak, a fish about four inches long, and had thoughtlessly poured away the water after the operation, before it occurred to the French bead-maker that the lustrous silvery sediment deposited at the bottom of the vessel might be turned to account in the manufacture of artificial pearls, or pearl beads.

It is indeed strange to consider how many of our most highly prized adornments and our most useful and important manufactures are derived from our own nation's refuse. The jet which brings in some twenty thousand pounds a year to the town of Whitby alone is merely a compact, highly lustrous and deep black variety of lignite, a species of coal less ancient in origin than that of the papered coals which we usually burn. And coal itself, as we know, is merely the refuse of ancient forests and jungles, peat swamps and cypress swamps, which have been crystallized in the course of ages and stored for our use in the bowels of the earth. Amber, too, which is also used for ornaments, especially in the East, is but the fossil gum or resin of the *Pinus succinifera*, large forests of which seem to have existed in the northern portion of what is now the bed of the Baltic. To the pine tree this gum was certainly nothing but refuse, a something to be got rid of; but Nature, who rejects nothing, however vile and contemptible, received it into her lumber room, her universal storehouse, and after keeping it patiently much more than the traditional seven years, sends it out again, transformed and yet the same, to adorn the Eastern beauty, and to give employment to many a skillful pair of hands. Bogwood, which like jet is used for bracelets, brooches, &c., is merely oak or other hard wood which has lain for years in peat bogs or marshes, and has acquired its dark coloring

from the action of oxidized metal upon the tannin it contained.

Turning, however, from Nature's processes to those of man, and how he is doing his best, however clumsily, to follow the thrifty example she sets him. For many and many a year no doubt the pine tree shed its pointed, needle-like leaves in the Silesian forests, and there they were left to decay and turn into mould at their leisure, until M. Panewitz started a manufactory for converting them into forest wool, which, besides being efficacious in cases of rheumatism when applied in its woolly mass, can also be curled, dyed or woven. Mixed with cotton, it has even been used for blankets and wearing apparel. The ethereal oil evolved during the preparation of the wool is a useful medical agent, besides being serviceable as lamp oil, and also as a solvent of camellion; and even the refuse left when the leaves have yielded up their oil and wood is not looked upon as rubbish, but is compressed into blocks and used for firewood; while the resinous matter it contains produces gas enough for the illumination of the factory.

Truly, as one man's meat is another man's poison, so one man's rubbish is another man's treasure. While the Russians export or simply waste all their rubbish, the Moslems, on the other hand, boil them, to extract their grease and gelatine; convert them into charcoal to be used in refining sugar; pass them on to the tanner, to be made into knife handles, or to the manufacturer of useful articles; or grind them up to supply phosphorus for the farmer's crops. The commonest and roughest kinds of old glass are now bought up by a certain manufacturer, who melts them up, colors the liquid, by a secret process of his own invention, in any tint he desires, and finally pours it out to cool in flat cakes. These are broken by the hammer into fragments of various size and shape, which are used to produce most effective decorations, such as might be introduced into the interior of almost any plain, unattractive looking building. The cost of this variety of mosaic is less than that of any other, and no doubt it will be extensively used as it is.

Even such insignificant things as cobwebs are turned to account, not merely for healing cut fingers—Bottom's sole idea as to their use—but for supplying the astronomer with cross lines for his telescopes, and for the painter of pictures, even when woven, though one cannot imagine where or how except in fairy-land, by fairy fingers, and for fairy garments; and among the curiosities which travelers bring home from the Tyrol are pictures painted upon cobwebs, the drawings of which are perfectly clear and distinct, with the spider's handwork at the same time plainly apparent. High prices are charged for these strange works of art, and no wonder; for the cobweb paper—which resembles a fly's semi-transparent gauze—looks as if it must be extremely unpleasant to draw upon; and no doubt the eccentric artist fails many times before he succeeds in producing a salable article. But we may descend even lower than cobwebs, to the scale of refuse, and still find that we have not reached the dead level at which things become utterly worthless and good for nothing. Nay, much that is sweetest, and associated in our minds with luxury and refinement, may now be produced from that which is in itself most repulsive; for while artificial vanilla can be made from the sap of the pine tree, essence of almonds from benzene, and the delicate perfumes of woodruff and melilot from coal tar, other scents and fragrances can be obtained from the unsavory refuse of the stable.

Perhaps there is nothing more interesting and instructive, as showing how the meaning of the word "rubbish" varies, than the history of the gas which is now so much used for lighting and heating. To begin with: the coal which yields most gas is what is termed "canal" coal, and is now worth from twenty-five to thirty shillings a ton, or more; whereas fifty years ago, before the introduction of gas, it was looked upon as the lowest quality of coal, and coal for gas, a liquor is produced which for a long time was so great an inconvenience to the gas companies that they actually paid for permission to drain it into the common sewers, as the simplest way of getting rid of it. This gas-liquor contains salts of ammonia, together with naphtha and tar; and the tar is now made by repeated distillation to yield pitch, benzole, cresote, carbofic acid, the substance known as paraffine, and distilling it seems strange now that these valuable products should ever have been thrown away as useless; still stranger is it to learn that we derive from one of these waste substances the whole series of beautiful colors called aniline dyes. Nothing but refuse and other residuary product, by a novel application of which it is said that the light-giving properties of gas may be enhanced fourfold at a very trifling cost. But the uses to which man has put the refuse of the gas-works may be put are not yet exhausted; for many it is turned to account itself, but combined with the slaty shales found among the coal, which were also at one time a source of perpetual annoy-

ance, it yields alum—used in the manufacture of paper and preparation of leather; copperas or green vitriol (sulphate of iron), used in dyeing, tanning, and the manufacture of ink and Prussian blue; and sulphuric acid.

Rags are now recognized as such a valuable commodity that in some countries their export is forbidden by government; nevertheless, from one source or another the paper-makers of England alone import annually some eighteen or twenty thousand tons of linen and cotton rags, and collect large quantities at home. These rags are of very varying degrees of cleanliness, as may be imagined; some of the English ones require no bleaching at all, while those of Italy bear away the palm for dirt. Old sails are made into the paper used for bank-notes, and old ropes re-appear as brown paper; but many other things besides flax, hemp and cotton are now used in the manufacture, and paper is made and remade over and over again. Not a scrap of paper need be wasted, for there are plenty of persons ready to buy it; and not good enough for re-manufacture as paper, it can always be converted into paper-mâché, no matter what its color or quality. Cuttings of paper served up by bookbinders, pasteboard makers, envelope-cutters, pocket-book makers and paper-hangers are readily bought up; and so too are tons' weight of old ledgers and account-books by the paper-mâché manufacturer, together with old letters and any other paper rubbish, giving a pledge that all shall be promptly consigned to destruction in his large vat; and out of this heterogeneous assemblage he produces a substance so hard and firm and durable that it has been suggested as suitable for making soldiers' huts and even ships. It is already put to a variety of uses, and is employed for cutting ornaments, combs, frames, mill-board, bulk-heads, cabin-partitions, piano-cases, chairs, tables, &c. One complete suite of paper-mâché furniture inlaid with mother-of-pearl was made a few years ago for the Queen of Spain. Woollen rags are always suitable for the purpose of being ground to powder, colored, and used for flock-papers and artificial flowers; while they may be re-manufactured, no matter how old they may be, and with a certain admixture of new wool, converted into a coarse kind of cloth largely exported to South America.

We might go on in this way almost *ad infinitum*, showing how our waste substance after removal has been taken up and made into an important factor in the social economy; but enough has been said to prove that it is not so easy as it might seem at first sight to say with any certainty what is rubbish. Of this we may be sure—the waste men grow and the more they learn of Nature's secrets, the less they throw away as useless. After all, Nature is the great alchemist.

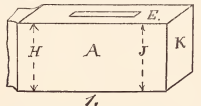
Good Testimony.

The *Druggists' Circular*, published in this city, in replying to a correspondent says:

"We advise you to apply with no unnecessary delay to some well-known and responsible party, who will present your invention at the Patent Office in Washington, and protect your interests against the sharp devices of piratical schemers. Messrs. Salem H. Wales & Son, No. 10 Spruce Street, can be conscientiously named for this purpose. The senior Mr. Wales has been for many years engaged as a patent agent, and is favorably known here in New York as thoroughly competent to manage such business or any other he may take in hand."

Shop and House Hints.

Hints on Connecting-rod Ends.—If the end of a connecting-rod be filed taper from J to K, as in the accompanying cut, when the rod is to be repaired, the faces (E) may be tried up, and the scrap should be fit it by piercing the outside strap crown, which will save putting the strap into the blacksmith's fire, and therefore save a great deal of filing and repolishing.

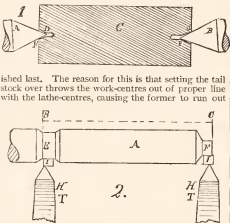


Food for Hens.—The food of hens should be considerably varied. Sometimes, for the want of ani-

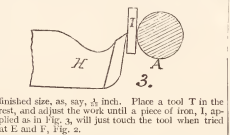
mal food, hens will pick the feathers from each other and eat them. This practice can be checked by feeding them a few times a week with any kind of waste meat from the table, or with the waste meat which can be obtained from meat-markets in towns and dries at a trifling expense.

Coating Iron with Iridescent Copper.—This is a new French process, highly recommended. The metalizing bath and the best proportions of ingredients are indicated in the following directions: First, 35 parts of crystallized sulphate, or an equivalent amount of any other salt of copper, are precipitated as hydrated oxide by means of caustic soda or some other suitable alkaline base; this oxide of copper is to be added to a solution of 150 parts of Rochelle salt, and dissolved in 1,000 parts of water; to this 60 parts of best caustic soda, containing about 70 per cent. NaO, is to be added, when a clear solution of copper will be formed. Other alkaline tartrates may be substituted for the Rochelle salt above mentioned, or even tartaric acid may be employed; but in the case of tartaric acid or acid tartrates a small additional quantity of caustic alkali must be added, sufficient to saturate the tartaric acid or acid tartrate. Oxide of copper may also be employed, precipitated by means of hypochlorite, but in all cases the proportions between the copper and the tartaric acid should be maintained as above, and it is advantageous not to increase to any notable extent the proportion of the caustic soda. The object to be coated is to be cleaned with a scratch brush in an alkaline-organic bath, attached to a cathode, immersed in the coppering bath, and treated with the usual precautions, when it will become rapidly coated with an iridescent film of metallic copper. As the metal gradually loses its copper, oxide of copper as above prepared should be added to maintain it in a condition of activity; but the quantity of copper introduced should not ordinarily exceed that above prescribed, as compared with the quantity of tartaric acid the bath may contain. If the quantity of copper notably exceeds this proportion, certain metallic iridescences are produced on the surface of the object. These effects may be employed for ornamental and artistic purposes. According to the time of the immersion, the strength of the current, and the proportion of copper to the tartaric acid, these iridescences may be produced of different shades and tints, which may be varied or intermingled by shielding certain parts of the object by an impermeable coating of paraffine or varnish, while the iridescent effect is being produced on the parts left exposed. All colors, from that of brass to brown, scarlet, blue and green, may be thus produced at will. If he desired to deposit nickel, the only modification of the above process requisite is the substitution of precipitated oxide of nickel for the oxide of copper, produced by precipitation as above mentioned. In the above process it will be observed that the introduction of sulphuric acid into the bath is avoided, at least except in such insignificant quantities as may still adhere to the precipitated metallic oxides.

Turning Tapers.—When a piece of work has a taper part, and it is to be turned on a lathe having a set-over tail stock, it should be roughed all over before any one part is finished, and the taper should be fin-



ished last. The reason for this is that setting the tail stock over throws the work-centres out of proper line with the lathe-centres, causing the former to run out



How to Use a Scraper.—Press it firmly to the work, holding it as close to the cutting edge as convenient, and go over the work as in Fig. 1. Now go over it as in Fig. 2. Then try the work with the surface-plate, and scrape again, when the work, if filed true before being scraped, will appear as in Fig. 3.

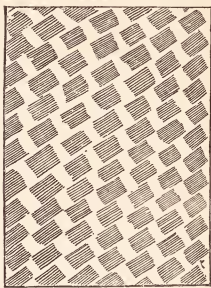


FIG. 1.

After this use the scraper on the bearing marks only. Always file a surface true before scraping it, as the file

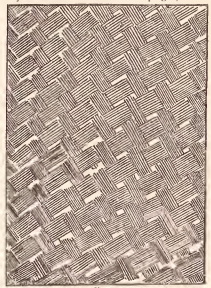


FIG. 2.

will remove surplus metal quicker than a scraper. Relieve the scraper on the back stroke.

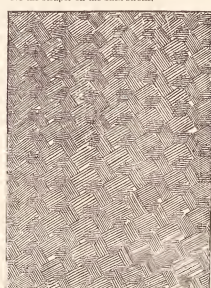


FIG. 3.

Phosphate of Lime from Ground Bones.—"G. B. C." inquires how to do this. First boil the bones in water under pressure of from 60 to 80 lbs. steam. This will extract therefrom the gelatine and oily matters. Next calcine the bones to convert them into bone-black. For this purpose retorts of refractory material similar to gas retorts are required. Next mix 3 parts by weight of the powdered bone-black with 3 parts by weight of the crude sulphuric acid of commerce, specific gravity 1.85, and 18 parts of water. Sulphate of lime will be precipitated, leaving the acid phosphate of lime in solution, which may be concentrated by evaporation. If a purer product is desired use 2 parts of pure concentrated sulphuric acid, instead of the diluted crude acid.

Puddler's Shield.—There has recently been intro-

Tory house, S. I. Russell	220,490	Steam generator, J. F. Freeman	220,590
Track-clearer, M. P. J. Turner	220,491	Serrap loop, H. P. R. Somerset	220,591
Trimming, machine for making futed, O. W. Whiting	220,492	Stove and furnace, W. A. Greene	220,592
Truck for loading lumber to stern, M. A. Bess	220,493	Stove, portable heating, W. A. Greene	220,593
Turning machines, stop-motion device for, F. Pearson	220,494	Stove, mica window and door for, W. A. Greene	220,594
Type-printing machine, C. Desroches	220,495	Stead, ship, G. H. Niles	220,595
Unbrake, E. J. Forbes	220,496	Tackle-block, J. W. McCulloch	220,596
Vapor burner, H. Wellington	220,497	Tackle-block, J. W. Necross	220,597
Varnish, R. H. Breinig	220,498	Tap-valve for barrels, M. G. Gillette	220,598
Vehicle and hand, J. W. Williams	220,499	Tapping and venting barrels, S. E. Fitch	220,599
Vehicle, spring, J. S. Corban	220,500	Thresh, apparatus for waxing, M. Chase and S. Zargant	220,600
Vessel-blank for trays and boxes, C. G. Udell	220,501	Time-measuring machine, C. W. Edelblute	220,601
Ventilating apparatus, C. A. Coffey	220,502	Tobacco press, R. C. Peyton	220,602
Rockefeller	220,503	Tongs, hardening, B. Le Doty	220,603
Vish and other bottles, apparatus for filling the necks, shoulders and lips, C. Connolly	220,504	Tongue support, J. W. McCulloch	220,604
Wagon-bogie, D. Gibbons	220,505	Tron, iron, M. M. McGregor and J. C. Croft	220,605
Wagon running-gear, A. Coffey	220,506	Truck, portable, C. L. Corbett	220,606
Wash-boiler, T. W. Kendall	220,507	Tube expander and beader, O. Pagan	220,607
Washing machine, M. Sewall	220,508	Vapor burner, W. H. Russell	220,608
Washing machine, C. L. Williams for, W. A. Bess	220,509	Vehicle-spring clip, C. W. Patten	220,609
Washing machine, powder, S. J. Anderson and P. W. Farley	220,510	Vehicle wheel, J. R. Baird (reissue)	220,610
Waste-pipes, device for removing obstructions from, T. R. Armstrong	220,511	Vinegar apparatus, S. Leary	220,611
Watch, wind-winding, P. H. Conant	220,512	Water expander, J. M. Rose	220,612
Water elevator, pneumatic pressure, A. H. Knapp	220,513	Wagon-dumping, A. McFarlane	220,613
Water-wheel, D. H. Anderson	220,514	Wagon-swing, J. O. Decker	220,614
Watering stock, apparatus for, P. Rausch	220,515	Washing machine, J. W. Estes	220,615
Weather-spring, J. W. Fletcher and W. M. Gilman	220,516	Washing machine, L. Fuller	220,616
Well-drift-clip, J. H. Latham	220,517	Washing machine, W. Hull and W. Miller	220,617
Windlass and derrick for boring artesian and other wells, R. F. Mull	220,518	Wash and sewer pipes, gas-check for, W. Wilson	220,618
Windmill, A. W. Chilcott	220,519	Water-tight joint, J. W. McCulloch	220,619
Zinc, manufacture of chloride of, W. H. Wall and E. V. Eltonhead	220,520	Water-tank, railway, J. D. Craig	220,620

PATENTS GRANTED OCTOBER 14TH, 1879.

Aerohat, J. J. Greenough	220,521	Wells, device for extracting or splitting the tubular ends of, G. H. Russell	220,621
Air-exhaust apparatus, J. Murphy	220,522	Wells, implement for grasping, withdrawing and performing the operations of, J. W. McCulloch	220,622
Automatic brakes, reissue, J. H. Latham	220,523	Wells, implement for grasping, withdrawing and performing the operations of, J. W. McCulloch	220,623
Auto-hose, J. H. Latham	220,524	Wells, implement for grasping, withdrawing and performing the operations of, J. W. McCulloch	220,624
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No. 3.—For the third largest list we will give as a premium, on same conditions as above, \$25.

Those receiving these competitive premiums will not be entitled to premiums for the same subscribers from the general premium list which follows; but all those who enter as competitors and fail to obtain either of the competitive premiums, may demand for the number of subscribers they send us a premium corresponding thereto, as above explained.

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These premiums may be selected, one premium corresponding to the number sent, or two or more premiums the equivalent of the same.

Any one approximating a number of subscribers for which is offered a particular premium, may fill out us in cash 50 per cent. of the money they remit short of reaching the required sum, also the sum required to meet the subscriptions they send us, and they will then be entitled to the premium selected by them.

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We will give this premium to any one who will send us 7 subscribers at \$1.10 each.

No. 21. Same as No. 20, without tray..... \$2.25
We will give this to any one who sends 6 subscribers at \$1.10 each.

No. 22. Case of Brass Drawing Instruments, 10 pieces, smaller than Nos. 20 and 21..... \$1.88
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No. 23. Achromatic Spy-Glass. Very fine; 33 1/2 inches long, 1 1/2 inch object glass, 3 draws..... \$7.00
We will give this premium to any one who sends us 13 subscribers at \$1.10 each.

No. 24. Achromatic Spy-Glass, 14 1/2 inches long, object glass 1 1/2 inch diameter, 3 draws..... \$3.35
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Archery Sets. Manufactured by Johnson, of Pittsburg, Pa. Each set includes patent bow, 1/2 doz. arrows, target, arm-guard and finger-tips.

We offer 3 sets only, of different sizes, each of which will be given to the first one who sends in the proper number of subscriptions to obtain it, with a request for the same. The retail prices of the sets are as follows:

No. 25. Target, 30 inches diameter; bow, 6 1/2 feet, with arrows to suit, arm-guard and finger-tips..... \$5.00
We will give this premium to the first one who selects it, sends us in 25 subscribers at \$1.10 each.

No. 26. Target, 30 inches diameter; bow, 6 feet; arrows to suit, arm-guard and finger-tips..... \$4.00
We will give this premium to the first one who selects it and sends in 20 subscribers at \$1.10 each.

No. 27. Target, 26 inches diameter; bow, 4 feet; arrows to suit, arm-guard and finger-tips..... \$7.00
We will give this premium to the first one who selects it, and who sends us 14 subscribers at \$1.10 each.

The above bows and targets are patented. The bows have metallic centres with arrow-rests, or "earrings" as they are called, which permits the arrow to pass without touching the feathers, and on a line exactly midway between the tips of the bow, which secures accuracy of flight. The wood limbs of the bow are of second growth white ash, handsomely painted, and are provided with nickel-plated metal tips that cannot break. They are detachable from the metallic centrepieces of the bow, which enables the weapon to be packed in small space for transportation. Remember we have only one set of each size to award; each to the first who claims it on above-named conditions.

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No. 29. Hand Scroll Saw with 7 valuable improvements; i.e. It has a solid emery wheel, and Improved clasp. Do. Polished nickel-plated tilting table. 4th. Straining rod, 6th. Improved method of setting up. 6th. It will save 20 cents from blade to brace. 7th. New style of painting in ultramarine blue, decorated in gold and silver. With these new give free New Process designs, 6 extra blades. Manual of Fret Sawing. These designs are a new invention and can be instantly transferred..... \$3.00
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No. 30. Stylographic Pen, short, plain..... \$3.00

No. 31. Stylographic Pen, gold-mounted..... \$2.50

No. 32. Stylographic Pen, long, plain..... \$3.50

- No. 33. **Stylographic Pen**, gold-mounted, \$4.00
 No. 34. **Stylographic Pen**, short, plain, \$4.00
 No. 35. **Stylographic Pen**, gold-mounted, \$4.50
 No. 36. **Stylographic Pen**, short, plain, \$4.50
 No. 37. **Stylographic Pen**, gold-mounted, \$5.00

(Nos. 30 to 33 with alloy points, Nos. 34 to 37 with iridium points.)

These pens write with ink, but look like an ordinary lead pencil. When filled with ink they can be used for a great deal of writing without any further supply and can be carried in the pocket like a pencil. Not a particle of ink escapes except when writing. The distinctive feature of the pen is that it can be held point downward for any length of time and not a drop of ink will escape, but touch the writing point to a piece of paper, and it makes a mark. Draw the pen along on the paper and it makes a continuous line. The pen will write at a single filling from 8,000 to 20,000 words. The materials used in its construction, vulcanized rubber, gold, silver and iridium, are non-corrosive; no drying or evaporation of the ink can occur; the pen can be filled in a moment; it works equally well on any kind of paper; any kind of copying ink or writing fluid can be used; it will rule from the edge of a business card without blotting; it can scratch out any error. The entire construction is very simple, and the point, the only part liable to injury, is covered when not in use with an eraser. The pen has had this pen in continuous use in our office for months and speak positively of its merits.

No. 30 will be given for 5 subscriptions at \$1.10 each.

No. 31 will be given for 6 subscriptions at \$1.10 each.

No. 32 will be given for 6 subscriptions at \$1.10 each.

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No. 38. **Chetograph**, pad 10 x 12½ inches, \$3.00

No. 39. **Chetograph**, pad 6½ x 10 inches, \$3.00

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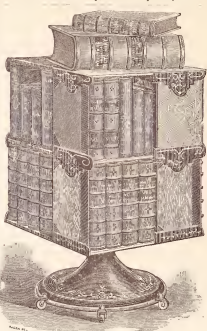
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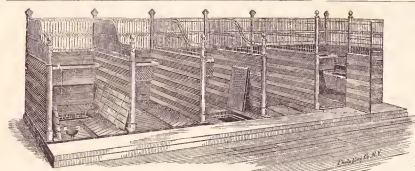
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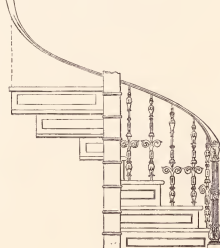
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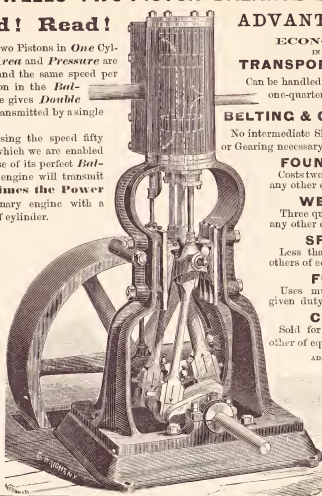
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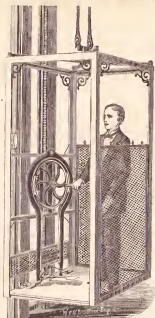
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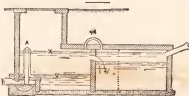
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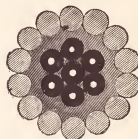
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